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PACIFIC OCEANIC FISHERY
INVESTIGATIONS

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THE SHRIMP FISHERY OF THE SOUTHERN UNITED STATES

By W. W. Anderson,* M. J. Lindner,** and J. E. King*

INTRODUCTION

The Shrimp Investigations[1] were established in 1931 by the U. S. Bureau of Fisheries in response to requests from the industry and the State conservation agencies, who had expressed concern over the possibility of depletion of the shrimp supply. The work has covered the range of the commercial shrimp fishery in eight maritime Southern States from North Carolina to Texas. Many of the studies and activities have been carried on in cooperation with the Louisiana Department of Wildlife Fisheries; the Texas Game, Fish, and Oyster Commission; and the Georgia Department of Game and Fish.

The shrimp fisheries of the United States and Alaska produced in 1945 (the last year for which complete figures are available) a total of 191,345,000 pounds valued at $21,369,000 to the fishermen compared with 1940 when 152,663,000 pounds were produced, valued at $5,954,000. Of the 1945 total, the South Atlantic and Gulf States fishery produced 189,024,000 pounds valued at $21,289,000 to the fishermen. During 1945, shrimp ranked fifth in volume and fourth in value of all the fisheries of the United States and Alaska, being exceeded in volume only by pilchard, menhaden, salmon, and sea herring, and in value by salmon, oysters, and tuna.

Shrimp is by far the most valuable fishery resource of the South Atlantic and Gulf States, being exceeded in volume only by the menhaden, which it exceeds several times in value. In view of the rapid growth of the industry and its major importance to the South, a careful and comprehensive study of the resource was indicated for the purpose of securing information which would assist the various conservation agencies in managing the resource so as to obtain a maximum sustained yield.

To date, the Investigations have contributed several publications.[2]

This report gives a brief history of the gear, geographical distribution of the fishery, fishing seasons in the various sections, relative importance of the various shrimp species, and catch statistics from 1880 to the present.

THE DEVELOPMENT OF THE FISHERY

The Introduction of the Otter Trawl

Until the otter or shrimp trawl was introduced some time between 1912 and 1915, the most efficient gear for catching shrimp was the haul seine. At about that time, the Bureau of Fisheries, at its station in Beaufort, North Carolina, had

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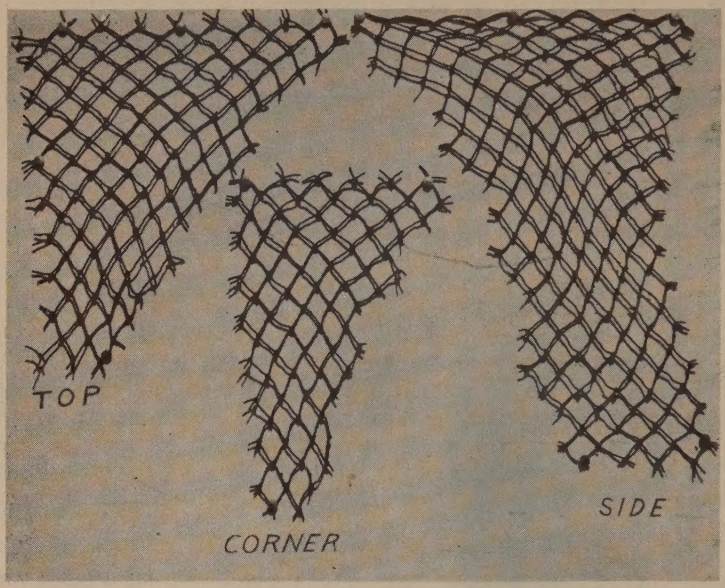
1/ Now Gulf Investigations.

2/ Weymouth, Lindner, and Anderson, 1933; Johnson and Lindner, 1934; Lindner, 1936; Pearson, 1939; Anderson and Lindner, 1943; and King, 1948.

Note: This leaflet supersedes Sep. 121, a reprint from Commercial Fisheries Review, February 1949, pages 1-17.

been using a small otter trawl for collecting marine forms. Fishermen, noting that shrimp were being taken by these nets, adopted the idea, and larger trawls were constructed for use in the commercial shrimp fishery. Apparently, the first shrimp trawling took place at Fernandina, Florida. Use of the trawl spread rapidly throughout the South Atlantic and Gulf regions and, by 1917, had become the standard commercial gear.



TAPER CUTS USED IN MAKING SHRIMP OTTER TRAWL

With the development and widespread use of the shrimp trawl, the haul seine gradually disappeared. Louisiana was the last locality in which it was employed. During the early 1930's, a few seines were still being used; but these dropped out one by one, until at present, there appears to be none in operation; and the trawl remains the exclusive gear for commercial operations.

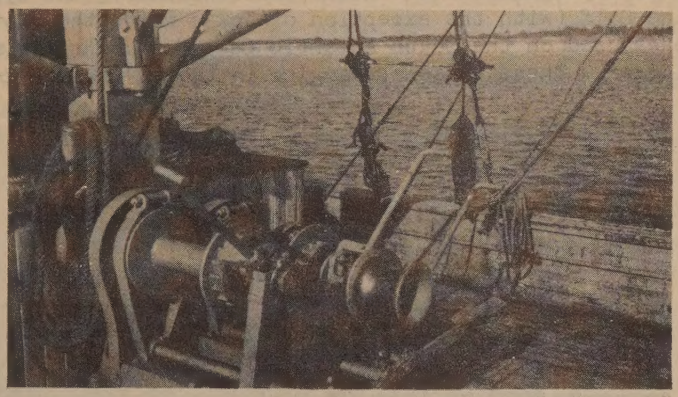
Introduction of the trawl completely revolutionized the shrimp industry. Whereas, the haul seine could be used only in shallow waters, required a large crew of men, and could be operated for only a limited time during the summer and fall months, the shrimp trawl was adaptable for use over a much greater range, could be operated with fewer men, yielded a greater production per man, and was a much more efficient type of gear. Its introduction opened up entirely new grounds, and led to a rapid expansion of the fishery.

TAIL OR BAG OF SHRIMP TRY NET USED BY SHRIMP TRAWLERS

Trawls now in use vary in size from the 10-foot try net, used for locating schools of shrimp, to the vessel's main trawl which may have a spread of 120 feet at the mouth. Its dimensions depend largely on the size and power of the vessel.

Vessels

SOUTH ATLANTIC: Improvement of the vessels employed in the fishery was rapid after introduction of the shrimp trawl. More seaworthy hulls, larger engines, and better deck equipment were necessary as the operations went farther afield and larger trawls were placed into use. By the middle 1920's, practically all shrimp boats on the South Atlantic Coast were equipped with some type of power winch for hauling the trawls. These winches were operated either from a separate deck engine or a power take-off from the main engine, and used in conjunction with a mast and boom or mast and "A" frame with rope towlines. The separate deck engine and "A" frame were gradually replaced by the winch powered from the main engine and used in connection with a boom, until at present, few if any, deck engines and "A" frames remain in operation. On the larger vessels, rope towlines and "A" frames were replaced by steel cables operating from an outrigger attached to the mast and running to a drum hoist powered from the main engine.



TYPICAL OTTER TRAWL WINCH USED IN SOUTHERN SHRIMP FISHERY

SHRIMP TRAWLERS IN PORT OF BRUNSWICK, GEORGIA

The fleet has evolved into two general types of craft. The first group consists of small boats approximately 30 to 45 feet in length, restricted primarily to local use. Generally, they are powered with gasoline or distillate burning engines, although there has been a recent tendency to use more diesel engines. These vessels usually are equipped with power winch and rope towlines. The second group is composed of vessels approximately 50 to 65 feet in length, practically all diesel powered and employing the steel cable and drum hoist rig. The latter vessels are naturally the more seaworthy and fish almost entirely in the outside waters. Since the design of this vessel was developed primarily in Florida, it has become widely known over both the South Atlantic and Gulf Coasts as the Florida-type trawler.

In general, the group of smaller vessels presents a varied array of designs, since local tendencies and individual ideas enter into their construction. The

Florida-type vessels, on the other hand, are all constructed along the same general lines.

GULF OF MEXICO: Until about 1938, when Florida-type trawlers were introduced into Louisiana for the new offshore fishery, the type of vessel in general use in the Gulf (with the exception of Texas where the boats were similar to the smaller ones used on the South Atlantic Coast) was fairly standard and was known as the lugger. These vessels, ranging in length from 25 to 50 feet, are of shallow draft

SHRIMP LUGGERS (IN GENERAL USE IN THE GULF PRIOR TO 1938) TIED UP ALONGSIDE DOCK OF SHRIMP PLANT AT BAYOU RIGAUD, GRANDE ISLE, LOUISIANA

and designed for the shallow inside waters. Consequently, they are not well suited for the open Gulf, particularly when the weather is bad. In contrast to the vessels of the South Atlantic Coast and Texas, in which the engines are forward and the fish hold is in the stern, the lugger has the engine in the stern and the fish hold forward. These early luggers were adapted for trawling by the simple expedient of adding a set of towlines and a trawl. Sometimes, a platform was extended off the stern to provide room for pulling in the net. Up until the late 1930's, few of these vessels carried power-driven machinery for putting out or taking in the trawls. At present, many of the better equipped and more recently built luggers employ a hoist, but on a number of the older boats, the gear is still operated entirely by hand.

As on the South Atlantic Coast, the shrimp fleet on the Gulf of Mexico can be classified into two types, the inshore and the offshore. The inshore vessels consist chiefly of the lugger type ranging in length from 25 to 55 feet and include the small Texas boats. They are usually powered with gasoline motors, but in recent years, more and more diesel engines have been installed on the larger vessels. They fish mainly the inside waters and Gulf waters close inshore. Peculiar to the Louisiana, Mississippi, and Alabama fishery is the use of ice or freight boats in conjunction with the small luggers. These ice boats are large luggers used for picking up shrimp on the fishing grounds, icing, and transporting them

to the cannery or other unloading station. The small vessels, as a rule, do not carry ice, but when they catch shrimp, they pull alongside an ice boat and unload. The ice boat collects shrimp until it gets a capacity load; then it proceeds to port, unloads, takes on more ice, and returns again to the fishing grounds. When a fleet of luggers is operating some distance from port, the ice boat will also supply the fleet with fuel, water, and provisions. Along the South Atlantic Coast and in Texas, each vessel carries its own ice and lands its catch individually. There are advantages to the ice boat system in the localities where it is employed. Quite often the luggers operate at considerable distances from the port where their shrimp are to be landed, and for each vessel to secure ice and bring in its catch would force it to spend much of its time in traveling to and from the fishing grounds.

The offshore trawlers operate chiefly in the open Gulf of Mexico. These vessels are of the Florida design and range from 50 to 65 feet in length, with a few from 75 to 85 feet. This type of vessel, because of its seaworthiness, was introduced into Louisiana from Florida about 1938 to engage in the offshore fishery. From Louisiana, its use spread rapidly over the fishery from Alabama to Texas. Typically, it is diesel powered and uses cable rigs with drum hoists powered from the main engine. It is capable of a wide range of activity, and commonly makes trips of 10 days' duration, which is about the limit of time ice will last or the catch can be safely held.

TYPICAL OFFSHORE TRAWLERS TIED TO THE DOCK AT MORGAN CITY, LOUISIANA

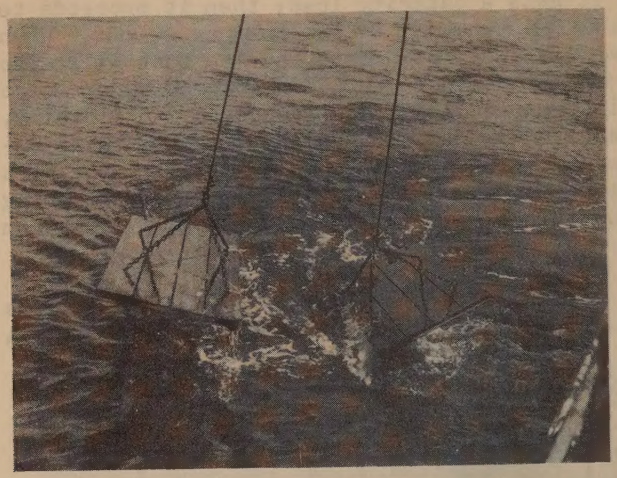
Since 1944, considerable interest has developed in 55- to 65-foot all-steel trawlers. Several of these have been placed in operation, and others are being constructed.

The most recent development is the mothership- or factory ship-type of operation, which is presently being explored by two or three enterprising companies. The motherships are vessels of 100 to 150 feet in length, equipped with the necessary machinery and crew for heading and freezing the catch. The large vessel may do some trawling on her own, but depends to a great extent on the catch of small feeder boats. As in other fisheries in other parts of the country, it is still to be determined whether or not such an operation can be carried out successfully.

Methods of Fishing

While the shrimp trawl gear is operated essentially the same by the inshore and offshore fleets, there are differences between the fleets in methods of locating shrimp.

INSHORE VESSELS: Use of the try net for locating shrimp is not as widespread among inshore vessels as among offshore vessels. Three general types of fishing methods appear to be prevalent. In the first, the fisherman uses no means of locating shrimp other than the main trawl. He goes to the fishing grounds where he thinks shrimp may be found. The main trawl is put out and dragged for a time and taken up. The length of drag is a matter of choice of the fisherman, but generally, the trawl is fished for one-half hour to two hours for each haul. If the catch is sufficient, the trawl is again put over; otherwise, a new area is sought and the procedure repeated. The second method, still being employed in shallow water areas, involves the use of a cast net thrown ahead of the boat as it moves slowly over the flats. When shrimp are taken in the cast net, the trawl is put out. As the trawling proceeds, the cast net is continually thrown ahead of the boat. If the boat passes into an area where shrimp can no longer be taken in the cast net, the boat is swung around to cover again the area where shrimp were found. This second method is employed in Louisiana but does not appear to be used elsewhere in the fishery. The third, and most efficient method, involves the use of a try net for locating shrimp before the large trawl is put into operation. A small trawl, usually about 10 feet wide at the mouth, is hauled behind the boat and pulled in at frequent intervals. As soon as shrimp are taken in sufficient abundance to indicate a worthwhile area, the large trawl is put out. The try net continues in operation just ahead of the large trawl and is pulled in at frequent intervals. By this means, the fisherman can tell whether he is still trawling through a concentration of shrimp or has passed beyond. When he has passed the concentration, he changes course and resumes trawling through the area where the try net showed shrimp to be present.



SETTING OTTER BOARDS FROM A SHRIMP TRAWLER

PORTION OF TRY NET AND DOORS USED BY OFFSHORE SHRIMP TRAWLERS FOR LOCATING SHRIMP

In Mississippi, on occasions, fishermen have used as a try net a conical bag of webbing attached to a semi-circular metal frame about 3 feet across the base. A short 3-strand bridle is fastened to the frame for towing from a single rope. It is believed that this type of try net has now been completely displaced by the miniature trawl.

Another method of locating shrimp has been observed in the shallow inside waters around Beaufort, North Carolina, and not elsewhere in the fishery. A long oar is put out from the side while the boat is running at slow speed close to shore. When shrimp are present, they can be readily seen as the moving oar disturbs them causing the shrimp to jump out of the water as the oar passes.

Fishermen will always try a muddy patch of water whenever one is found as frequently, concentrations of shrimp, presumably while feeding, will stir up quantities of mud. This is not infallible, as schools of fishes also cause muddy patches.

OFFSHORE VESSELS: All offshore craft employ a try net for locating shrimp. It operates from an outrigger with a steel cable running to a drum hoist. Since the offshore fishing grounds are rather extensive, a vessel may spend considerable time searching before shrimp are found. The large trawls are put out when the try net hauls show indications of a concentration of shrimp. As trawling proceeds, the try net, similar to the procedure used by the inshore boats, is hauled ahead of the large net and pulled in at frequent intervals to enable the vessel to stay with the concentration of shrimp. If a good catch is made on a location, or the try net shows shrimp present in quantity, a buoy may be put out to mark the area.

A MIXED CATCH OF FISH AND SHRIMP JUST AS IT HAS BEEN DUMPED ON THE DECK OF AN OFFSHORE SHRIMP TRAWLER

Shore Establishments

SOUTH ATLANTIC STATES: In the South Atlantic States, shrimp are landed at two principal types of shore plants: canneries and raw-shrimp houses. The main cannery centers are at Thunderbolt, Darien, and St. Marys, Georgia; and Fernandina, Florida; but in recent years, they have operated only intermittently. Canneries are necessarily the more elaborate and costly type of shore facility, since they must contain processing equipment not required in the raw-shrimp plants. In addition,

they must be located at points where production is large and fairly stable, since they cannot change their locations from one area to another, like the raw-shrimp plants. In general, the canneries depend largely on the smaller-type vessels to supply their raw product, and the bulk of the pack is put up during the fall season.

The raw-shrimp plants, which handle the largest percentage of the production, are relatively simple establishments. In general, they consist of an unpartitioned building in which are located a small office, tables for heading shrimp, washing vats, a set of scales, ice crusher, and space for storing boxes and fishing gear. Some of the more permanent ones, like many of the canneries, may have in conjunction, a small machine shop and other facilities for upkeep of the vessels. The raw-shrimp plant dealers operate most of the larger Florida-type boats.

A TYPICAL LOUISIANA OFFSHORE TRAWLER OF ABOUT 60 FT. OVER-ALL LENGTH AND 16 NET TONS

As the fishery expanded, many of the raw-shrimp dealers began operating at various locations up and down the coast following the run of shrimp. For example: an operator may work the fall run in South Carolina or Georgia, move to Florida for the winter fishery, and then return to South Carolina or Georgia for the spring season.

Principal landing ports from which raw-shrimp dealers operate are Atlantic, Beaufort, Morehead City, and Southport, in North Carolina; Charleston, Beaufort, and Georgetown in South Carolina; Thunderbolt, Darien, Brunswick, and St. Marys in Georgia; Fernandina, Mayport, St. Augustine, and New Smyrna in Florida.

GULF OF MEXICO: In the Gulf of Mexico, shrimp are landed principally at canneries and raw-shrimp plants; and in addition, in Louisiana, at drying platforms and stations where there are only docks, from which the shrimp are trucked to a plant or market.

The great majority of the shrimp canneries are located along the Gulf Coast, mainly in Louisiana and Mississippi. The principal cannery centers from East to West are: Bayou LaBatre, Alabama; Biloxi, Mississippi, New Orleans and vicinity, Houma and vicinity, and Golden Meadow, Louisiana.3/

The canneries draw most of their production from the smaller type of vessels, but for the past several years, they have been receiving increasingly greater amounts

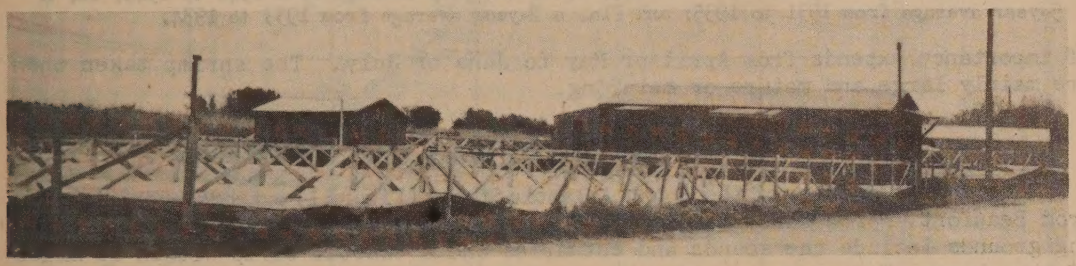
3/ There are also two plants in Texas at Aransas Pass and Palacios, which operate intermittently.

from the larger craft. The canned pack is put up largely during the fall season. In recent years, the canneries, because of greater profit, have been diverting much of their raw product to the fresh and frozen shrimp markets.

In the Gulf of Mexico, the raw-shrimp plants tend to be a more permanent type of establishment, as the dealers do not move from one place to another. The larger concerns may have their own fuel tanks, machine shops, boat ways, etc., as do many of the canneries. Although the raw-shrimp dealers operate most of the offshore trawlers, many draw their production from inshore boats as well. Many new raw-shrimp companies have entered the fishery in the past several years.

Shrimp are landed at raw-shrimp houses in every shrimp fishing port along the Gulf Coast. The greatest concentration of these establishments is in the vicinity of Morgan City, Louisiana, the home port for the majority of the rapidly growing offshore fleet.

The sun drying of shrimp is limited to the State of Louisiana and is concentrated largely in the Barataria, Timbalier, and Terrebonne Bay areas. The drying platforms



A SMALL SHRIMP DRYING PLATFORM ON BAYOU GRAND CAILLOU BELOW HOUMA, LOUISIANA

utilize small shrimp which are usually not desired by either the raw-shrimp houses or the canneries. At one time, a large volume of shrimp was utilized for this purpose, but sun drying appears to be declining.

Perhaps in response to the demands of the public, continually more shrimp are appearing on the market as an attractively packaged, frozen product. New freezers have been built and are being built throughout the range of the fishery. This assures the consumer of a more fresh and sanitary product than he received when the shrimp were shipped and handled in distant markets as "fresh-iced." Furthermore, the cold-storage facilities of the freezers permit the accumulation of the product during the height of the season and its release during times of low production.

GEOGRAPHICAL DISTRIBUTION, MAIN FISHING AREAS, AND SEASONS

For material giving an indication of the seasons in the various States, we have drawn on data from varied sources and periods. Data for recent years were used where available, but for Georgia and Florida only, data for earlier years could be used. Although not as uniform as might be desired, the material indicates quite clearly the main seasons in each of the States.

In Table 1, the average monthly production of shrimp in the various States is expressed as percentages of the average yearly total catch.

In general, all of the States have their maximum production from August or September to November or December. The shrimp taken then are largely young and immature, and had been spawned the preceding spring. A second and lesser season

Table I - Percentages of the Shrimp Catch by Months - South Atlantic and Gulf States

Month	N. C.	S. C.	Ga.	Fla.	Ala.	Miss.	La.	Tex.	Total
January	3.3	0.0	2.2	18.8	1.3	6.7	11.2	2.2	10.4
February	0.0	0.0	2.5	11.2	.8	4.2	7.2	1.6	6.6
March	.3	0.0	2.8	10.4	.6	2.6	4.0	1.1	4.2
April	.5	.1	3.6	8.2	.1	3.3	1.9	4.4	2.8
May	1.2	1.9	6.1	4.7	.7	5.5	3.3	10.3	4.2
June	.7	2.9	8.0	6.2	3.8	2.7	7.6	10.2	7.5
July	7.9	9.5	5.5	2.5	2.0	1.4	6.4	5.5	5.9
August	19.2	16.8	16.8	5.8	24.0	8.0	2.7	3.3	4.1
September	19.9	24.9	19.7	5.9	20.5	12.4	12.0	19.2	12.8
October	29.5	28.5	17.2	5.0	17.4	21.0	13.3	21.5	14.0
November	15.8	14.1	12.2	6.7	20.0	21.1	15.8	13.6	14.5
December	1.7	1.3	3.4	14.6	8.8	11.1	14.6	7.1	13.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Data for N. C., S. C., Ga., La., and Tex. are from the various State Conservation Agencies; for Fla., from records of the U. S. Fish and Wildlife Service Statistical Agent; and for Ala. and Miss., from the U. S. Fish and Wildlife Service Market News reports.

For N. C., Ala., Miss., La., and Tex. the percentages are derived from a 5-year average covering the years 1941 to 1945; S. C. a 4-year average from 1941 to 1944; Ga. a 5-year average from 1931 to 1935; and Fla. a 2-year average from 1933 to 1934.

of importance extends from April or May to June or July. The shrimp taken then are mainly large and mature or maturing.

South Atlantic States

The shrimp fishery of the South Atlantic States (Figure 1) extends approximately from Beaufort, North Carolina, to Fort Pierce, Florida. Within this area, the fishing grounds include the sounds and estuaries and a coastal strip within 10 miles of the shore. However, most of the ocean fishery is conducted between the shoreline and about six miles offshore. The fishery is almost continuous from about Bull's Bay, South Carolina, to the St. John's River, Florida, while in the northern and southern extremes of the range, the fishing grounds are scattered.

NORTH CAROLINA: North Carolina has two principal fishing areas.4/ One, which represents the northern limit of the fishery, is in the Beaufort-Morehead City section. Here most of the fishing is in the inside waters around the mouths of the Neuse and Newport Rivers, in Core and Pamlico Sounds, and in the coastal waters a short distance each side of Beaufort Inlet. The second area is in the coastal waters off the mouth of Cape Fear River, with Southport as the base for operations. Principal fishing grounds extend about 10 miles to the west from Cape Fear Point; but scattered fishing is done down to about Little River Inlet.

About 84 percent of the total yearly catch is obtained from August through November with the peak during October.

SOUTH CAROLINA: The northern half of the South Carolina coastline, from Little River Inlet to Cape Romain, is not a productive area for shrimp. In this section, there is, off Winyah Bay entrance, a small fishery which operates from Georgetown. The principal fishing grounds are located in the coastal waters from off Bull's Bay to Tybee Roads. While continuous fishing grounds are found throughout this southern half of the coastline, the more productive grounds are from Stono Inlet south to the Georgia line. Many of the South Carolina sounds would be included in the fishing areas, but these are closed to fishing by State regulation. Principal landing ports are Charleston and Beaufort.

4/ During 1948, large quantities of shrimp were taken in the upper part of Pamlico Sound and landed at Engelhart and nearby ports (Editors).

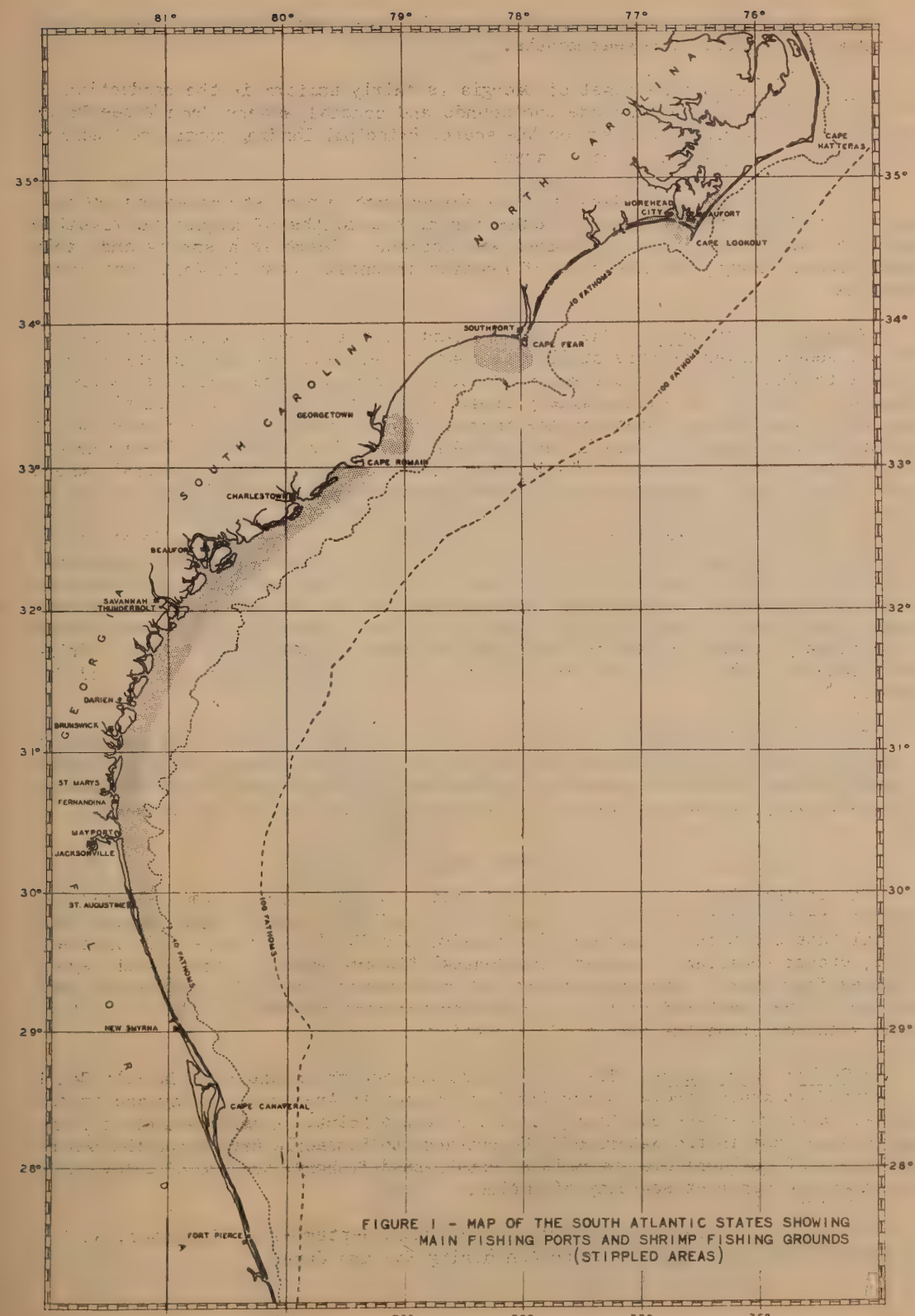


FIGURE 1 - MAP OF THE SOUTH ATLANTIC STATES SHOWING MAIN FISHING PORTS AND SHRIMP FISHING GROUNDS (STIPPLED AREAS)

About 84 percent of the total production is taken from August to November with September and October the peak months.

GEORGIA: The entire coast of Georgia is fairly uniform in the production of shrimp. Fishing grounds include the sounds and coastal waters from Tybee Roads on the north to St. Mary's River on the south. Principal landing ports are Thunderbolt, Darien, Brunswick, and St. Marys.

As in North and South Carolina, the predominant run of shrimp--about 66 percent of the total production--is found during the months of August to November with the peak production in September and October. There is a spring and early summer season during May and June of greater intensity than in North and South Carolina.

FLORIDA: East Coast: The northern part of the Florida coastline down to the St. John's River is very similar to that of Georgia, and the fishery is continuous to this point. To the south of St. John's River, the coastline is broken by major inlets at two rather widely separated points; one at St. Augustine, and another at New Smyrna. South of New Smyrna, Fort Pierce is the only inlet where shrimp fishing is active. This is the southern limit of the fishery. The principal fishing grounds are centered around these inlets, except at Cape Canaveral, where there is no inlet. Between the St. John's River and New Smyrna, shrimp are taken at some points between inlets, but, in general, these are not so productive as the grounds near the entrances. From a short distance south of New Smyrna Inlet to the southern side of Cape Canaveral, very little fishing is done. The Cape Canaveral ground extends south from the tip of the Cape to about Melbourne. South of Melbourne, there is no fishery of consequence, although some shrimp are taken off Fort Pierce, where a few spots of suitable bottom are to be found. South of Fort Pierce, there is no fishery, owing in part to the rocky and coral nature of the bottom. Principal landing ports in Florida are Fernandina, Mayport, St. Augustine, and New Smyrna.

The period of greatest production in the north Florida area--from the Georgia boundary to the St. John's River--is comparable to that of Georgia, roughly, August through November; and in the central Florida area--St. Augustine to Cape Canaveral--it occurs from December to March with the peak during December and January.

Gulf of Mexico

The shrimp fishery in the Gulf of Mexico embraces an area from Apalachicola, Florida, to the Mexican border in Texas, and includes sounds, bays, bayous, and coastal waters out to a distance of approximately 50 miles (Figure 2). In every State, except Louisiana, however, the coastal fishery does not extend much beyond 10 miles from shore. The grounds are not continuous over this entire section, but tend to be scattered at the two extremes and more concentrated in the central area, with Louisiana the center of production.

FLORIDA: West Coast: The main production center on the Florida Gulf Coast is located at Apalachicola, where fishing is done in Apalachicola Bay and in the coastal waters from Cape St. George to St. Joseph's Point. A small amount of fishing is also done in the waters off the entrance to Pensacola Bay. Along the peninsula south of Apalachicola, there is no established fishery, because of unfavorable bottom and an apparent scarcity of shrimp.

The period of greatest production runs from September to December, with a smaller spring and early summer season during May and June.

FIGURE 2 - MAP OF THE NORTHERN GULF OF MEXICO SHOWING MAIN FISHING PORTS AND SHRIMP FISHING GROUNDS (STIPPLED AREAS); DOUBLE STIPPLING INDICATES THE AREA MOST HEAVILY FISHED BY THE LOUISIANA OFFSHORE FLEET

ALABAMA: Fishing grounds in Alabama are rather limited, owing to the short coastline. The principal fishing grounds are in Mobile Bay and Mississippi Sound; of lesser importance is the coastal region adjacent to Mobile Bay entrance. Principal landing ports are Bayou LaBatre, Mobile, Coden, and Bon Secour.

The heaviest production occurs from August to December with August to November accounting for approximately 82 percent of the total. The monthly catch during this period is about equally divided.

MISSISSIPPI: The main fishing grounds of Mississippi are Mississippi Sound and the coastal waters off Horn and Ship Islands. Mississippi craft fish extensively in Louisiana waters to the east of the Mississippi River. Principal landing port is Biloxi; but shrimp are also received in lesser quantities at Pascagoula, Pass Christian, Bay St. Louis, and Gulfport.

The predominant run is from September to December with the peak during October and November. A second, smaller run occurs during the spring and early summer, centering in May.

LOUISIANA: The fishing grounds in Louisiana can be separated into two divisions: those lying to the east of the Mississippi River, and those to the west. The principal areas to the east of the River are Chandeleur and Breton Sounds, and the coastal waters between the Chandeleur Islands and the Mississippi Delta. To the west of the River lie perhaps the richest and most extensive fishing areas to be found anywhere in the shrimp fishery. This western area can be separated into two rather distinct sections: the inside and the offshore grounds.

ATTACHING CHAFING GEAR ON BAG OF SOUTHERN SHRIMP TRAWL

The most important inside grounds are Barataria, Timbalier, Terrebonne, and Caillou Bays, and many of the connecting bayous. Some fishing is also carried out in the Atchafalaya and Vermillion Bay areas. To the west of Vermillion Bay, no productive inside grounds are to be found.

The coastal waters from the Mississippi River to the Texas line comprise the offshore grounds. While shrimp are caught over this entire stretch of coastline, the most productive grounds are the Ship and Trinity Shoal areas, lying roughly between 90°30' and 92°30' west longitude. The vessels work in from 2 to about 30 fathoms of water, but most fishing is done between 5 and 15 fathoms. Landing ports in Louisiana are widely scattered and more numerous than in any other section of the fishery, and no attempt will be made here to name them all. The major centers include the following: the New Orleans area, which draws shrimp from the Mississippi River Delta and Barataria Bay sections; Golden Meadow; Houma; Morgan City-Berwick-Patterson; and Cameron.

Of special interest is the Louisiana offshore fishery, which began in 1938, and was initiated largely by vessels and people who migrated from Florida and

settled in the Morgan City area. This includes the cities of Morgan City, Berwick, and Patterson, all lying within a few miles of each other. While this area will no doubt continue to be the most important base for the offshore fishery because of its central location with respect to the best fishing grounds, recently increasing numbers of offshore boats have been appearing in other sections of the State.

The development of the offshore fishery has materially increased the total poundage of shrimp taken in Louisiana waters, as will be noted from the annual catch records for the past 10 years (Table 2). This increase has come from a portion of the shrimp fishing grounds which before had been almost entirely unutilized. Since the larger shrimp, which bring the highest prices, are taken in the offshore fishery, the increase in value to Louisiana has been greater than the increase in poundage.

Table 2 - Shrimp Catch of the South Atlantic and Gulf States, by States

Year	North Carolina	South Carolina	Georgia	Florida	Subtotal for S. Atlantic	Alabama	Mississippi	Louisiana	Texas	Subtotal for Gulf	Grand Total
					(In thousands of pounds)						
1880	63	630	56	72	821	1/	1/	534	638	1/	1/
1887	120	338	185	1/	1/	1/	1,145	6,810	255	1/	1/
1888	124	359	191	1/	1/	44	1,093	6,943	259	1/	1/
1889	135	380	150	78	743	30	794	7,239	242	8,305	9,048
1890	144	372	162	65	743	1/	614	6,662	176	1/	1/
1897	146	375	68	39	628	41	1,903	4,487	361	6,792	7,420
1902	84	370	344	3,030	3,828	0	4,424	7,635	291	12,350	16,178
1908	371	452	528	4,354	5,705	37	4,121	8,581	119	12,857	18,562
1918	940	55	5,793	12,118	18,906	1,266	9,147	18,520	164	29,097	48,003
1923	1,658	355	10,668	13,905	26,586	3,182	9,879	27,753	3,422	44,236	70,822
1927	1,276	1,657	12,279	17,169	32,381	5,162	9,234	40,259	11,832	66,486	98,867
1928	845	431	9,526	25,384	36,186	5,972	11,767	53,779	7,774	79,292	115,478
1929	897	288	12,378	18,619	32,182	4,396	13,101	49,456	9,415	76,368	108,550
1930	1,299	793	8,853	16,849	27,793	2,982	8,489	38,664	10,189	60,324	88,117
1931	338	2,635	5,471	18,853	27,297	2,475	17,716	35,148	13,814	69,153	96,450
1932	292	1,501	3,602	18,136	23,531	3,382	14,010	38,096	9,244	64,732	88,263
1934	2,564	1,801	6,843	16,292	27,500	4,557	15,330	55,572	16,359	91,818	119,318
1936	3,815	1,101	9,715	20,725	35,356	1,869	17,493	53,430	9,963	82,755	118,111
1937	4,184	1,201	9,504	14,037	28,926	3,104	23,558	68,781	16,905	112,348	141,274
1938	4,569	3,723	10,426	10,143	28,861	3,644	2/9,902	81,379	16,365	111,290	140,151
1939	4,811	4,090	10,802	8,782	28,485	2,124	5,676	100,613	11,173	119,586	148,071
1940	4,157	1,784	9,336	8,369	23,646	4,565	8,566	98,986	14,779	126,896	150,541
1945	10,614	4,696	16,392	13,662	45,364	4,439	6,595	116,904	15,722	143,660	189,024

1/Data not available.
2/Prior to 1938, shrimp taken by Mississippi craft in Louisiana waters were included in the catch for Mississippi. Since 1938, such catches are included in the Louisiana production figures.

Due to the nature of the fishery, shrimp are landed in quantity during most of the year. However, in common with most of the other sections of the fishery in the Gulf, there are two main seasons. The greatest production occurs during the period from September to January. Beginning in May and extending to July, there is a second, smaller run.

TEXAS: The Texas fishing grounds include both inside bays and coastal waters. The principal inside areas are Matagorda, San Antonio, Aransas, and Corpus Christi Bays. Some fishing is carried on along the entire length of the coast, but the fishery is principally in the Galveston, Pass Cavallo, Aransas Pass, and Port Isabel sections. The more important landing ports are Galveston, Palacios, Port Lavaca, Aransas Pass, Rockport, Freeport, and Port Isabel.

The period of greatest production is from September to November with the peak during September and October. There is a second though smaller season of abundance having its beginning in April, extending to July and with the maximum during May and June.

SPECIES OF SHRIMP ENTERING THE CATCH AND RELATIVE IMPORTANCE OF EACH

Although numerous species of shrimp are found along the South Atlantic and Gulf Coasts, only five are of commercial importance. These are: the common shrimp (Penaeus setiferus); the three grooved shrimp (Penaeus aztecus, Penaeus duoarum, and Penaeus brasiliensis); and the sea-bob (Xiphopenaeus kroyeri). Until recent years, all of the grooved shrimp were included under the single species (P. brasiliensis). Burkenroad (1939) demonstrated that there were actually three distinct species. All three of these "brasiliensis group" species occur on the South Atlantic Coast, but only two, P. aztecus and P. duoarum, have been recorded for the northern Gulf Coast. The fishermen do not distinguish between these three species. To the industry, they are all classed as "brasilian" shrimp or "brownies."

Of the shrimp commonly taken by the trawlers but of no commercial importance, are several species of Eusicyonia, of which E. brevirostris is the most abundant, and two species of Trachypenaeus, of which T. constrictus is predominant on the South Atlantic and T. similis on the Gulf Coast. There appears to be no common names in general use for these species, although the Eusicyonia are sometimes referred to as marble or hardback shrimp.

All of these species belong to one family, the Penaeidae. For means of identifying them see Anderson and Lindner (1943).

The common shrimp, P. setiferus, is outstandingly the most important commercial species. It is impossible to obtain separate figures on the production of the various commercial species landed throughout the fishery as the catch is not recorded or reported by species. On the basis of our own trawling operations, observations on catches landed, and estimates made by dealers, it appears that the common shrimp accounts for at least 95 percent of the total catch and probably more.

The grooved shrimps and the sea-bob make up the remainder of the catch, the sea-bob being the less important. Since it is only in Louisiana that the sea-bob is utilized--and here for drying purposes only, being discarded as too small for other purposes--we estimate that 1 percent of the total catch is made up of sea-bob and 4 percent of the grooved shrimp.

Of the three grooved shrimp, P. aztecus appears to be the most abundant over the entire range of the fishery, with P. duoarum next and P. brasiliensis third. The largest catches of grooved shrimp are taken during the late spring and early summer on the inside fishing grounds where the young appear before the young of the common shrimp. Some quantity is taken in the outside waters, especially in Louisiana by the offshore fleet in the deeper waters. Louisiana, undoubtedly, has a larger catch of grooved shrimp than any other State. Near Beaufort, North Carolina, at times during the summer, the grooved shrimp are caught in greater quantities than are the common shrimp.

CATCH STATISTICS

All the available data on quantity of shrimp produced in the South Atlantic and Gulf States are shown in Table 2, by States, for certain years 1880 to 1945. As can be seen from Table 3, which gives a distribution of the shrimp catch by areas and States for 1945, Louisiana is producing about two-thirds of the total catch of the entire fishery.

As shown in Table 2, the introduction of the otter trawl in 1912-15 marked the beginning of a great expansion in the shrimp fishery. Production climbed rapidly until 1929. The low price of shrimp during the depression years which

Table 3 - Percentage of Shrimp Catch by States for the South Atlantic and Gulf for 1945
(In thousands of pounds)

State	S. A. & Gulf States		South Atlantic States		Gulf States	
	Pounds	Percent	Pounds	Percent	Pounds	Percent
Louisiana	116,904	61.8	-	-	116,904	81.4
Georgia	16,392	8.7	16,392	36.1	-	-
Texas	15,722	8.3	-	-	15,722	10.9
Florida	13,662	7.2	13,662	30.1	-	-
North Carolina	10,614	5.6	10,614	23.4	-	-
Mississippi	6,595	3.5	-	-	6,595	4.6
South Carolina	4,696	2.5	4,696	10.4	-	-
Alabama	4,439	2.4	-	-	4,439	3.1
Total	189,024	100.0	45,364	100.0	143,660	100.0

followed furnished little incentive to the fishermen. As a result, production dropped off about 25 million pounds. By 1934, the catch was restored to the former high level, and continued to increase until 1940. Since 1940, the production has shown minor fluctuations probably related to war conditions, but in the main there has been a steady increase reaching a record peak in 1945. In the States for which there are records complete to the present time, it is impossible to detect what might be called "definite signs of depletion" of the resource.

Other statistical data, such as the number of vessels, trawls, seines, fishermen, shore plants, fishery products, etc., for the years 1880-1932, may be obtained from Johnson and Lindner (1934). Data for later years are covered in the series "Fishery Statistics of the United States."

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